UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
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CRUISE REPORT

F/V Prowler Cruise No. 87-01

Longline Survey of the Gulf of Alaska

July 15 to September 21, 1987

On September 21, 1987, the National Marine Fisheries Service, Northwest and Alaska Fisheries Center (NWAFC), completed the first domestic longline survey for sablefish (Anoplopoma fimbria) on the upper continental slope of the Gulf of Alaska. The survey area extended from Islands of Four Mountains (170° W longitude) eastward to Dixon Entrance. A unique aspect of this survey was that the chartered vessel was allowed to retain most of the catch once the scientific data was recorded.

OBJECTIVES

1. Determine the abundance and size composition of commercially important longline-caught species including sablefish, Pacific cod (Gadus macrocephalus), shortspine thornyhead (Sebastolobus alascanus), and rougheye and shortraker rockfishes (Sebastes aleutianus and S. borealis) along the upper continental slope of the Gulf of Alaska.

2. Determine the abundance and size composition of other groundfish species caught during the survey, including Pacific halibut (Hippoglossus stenolepis), arrowtooth flounder (Atheresthes stomias), Greenland turbot (Reinhardtius hippoglossoides), and grenadiers (Macrouridae).

VESSEL AND GEAR

Survey operations were conducted using the F/V Prowler, a chartered U.S. longline vessel. The 35 m (115 ft) vessel carried standard longline hauling gear and was equipped with a processing line, two sets of plate freezers, and refrigerated holds. Vessel personnel consisted of a captain, eight fishermen and processors, and a cook.

Total groundline set each day was 16 km (8.6 nmi) long and contained 7,200 hooks. Skates of gear were 100 m (55 fm) long

and contained forty-five Eagle Claw[a] No. 7 circle hooks. Hooks were attached to 38 cm (15 in) gangions which were secured to beckets tied into the the groundline at 2 m (6.5 ft) intervals. Five meters (16 ft) of groundline was left bare on each end. Gangion material was stiff lay #48 thread, becket material was medium lay #60 thread, and the groundline was medium lay 95 mm (3/8 in) Goldline[a]. Each end of a set started with a flag and buoy array, and was followed by a buoyline, a 92 m (50 fm) section of polypropylene floating line, a 16 kg (35 lb) piece of chain at the bottom end to dampen the effect of surge on the buoyline, 92 m (50 fm) of Goldline, a 27 kg (60 lb) halibut anchor, 366 m (200 fm) more of Goldline, and finally the groundline with hooks. The groundline was weighted with 3.2 kg (7 lb) lead balls snapped on at the end of every fourth skate and 0.5 kg (1.0 lb) of lead seine weights snapped on between the other three skates. Each hook was hand baited with chopped herring at a rate of about 5.7 kg (12.5 lb) per 100 hooks.

Initial plans were to set 160 skates along a continuous groundline with buoys at each end and two buoylines in between. Without a second line hauler, the intermediate buoylines could not be conveniently retrieved, and instead the gear was set in two equal parts of 80 skates. The two sets were laid end to end.

NWAFC supplied all of the longline gear except for the flags, buoys, buoylines, and anchors, which were furnished by the vessel owners. In addition, the vessel owners supplied the bait.

OPERATIONS

The cruise was divided into three legs of 20, 20, and 25 working or travelling days, respectively. During Leg 1 the survey progressed from east to west from the southwest end of Kodiak Island to Islands of Four Mountains (170° W longitude). Leg 2 began in Shelikof Trough and worked eastward to Cape St. Elias, and Leg 3 continued the survey to its southeastern limit near Dixon Entrance.

A total of 69 days were used to conduct the survey including one day each for gear preparation and testing, four days lost to bad weather, one day in port to treat an injured crewman, two days to repair electronic equipment, seven transit days, two days in port to unload fish, change scientific staff and resupply the vessel, and 51 days of survey sampling.

Survey operations

Sampling was conducted along the upper continental slope in the Gulf of Alaska at 47 preassigned sites at a rate of one site (station) per day. The 47 stations correspond to stations 62 through 108 of the Japan - U.S. cooperative longline survey. Depths sampled during the survey ranged from about 100-1,000 m,

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[a] Citation of the above brand names does not constitute U.S. government endorsement.

but at a single station often did not cover this full range (Table 1). In addition, a test set (No. 48) was made on the first day of operations, two extra sets (No. 49 and 51) were made in Shelikof Trough and two more (No. 52 and 53) in the gully off Cape Ommaney (Figure 1). These gully stations were sampled to compare relative abundance and size composition of sablefish to those found in the adjacent stations on the continental slope.

The gear was set from shallow to deep and was retrieved in the same order except on infrequent occasions when groundlines parted. Generally, setting began about 0630 and gear retrieval began about 0930. Hauling and data collection continued until completion, sometimes later than 2000 hours.

Data collection

During retrieval a scientist at the rail recorded the species of each hooked fish, and also noted the condition of each hook, whether absent, broken or tangled, or whether bait remained on the hook. Time of day and depth were recorded when the first and last skate came aboard and also at the beginning of each fifth skate.

Lengths of sablefish, Pacific cod, grenadiers, arrowtooth flounder, rockfish, and thornyheads were taken. Lengths of all sablefish and Pacific cod were recorded when catches were small to moderately large. When catches were large, a representative sample was taken. Sablefish and Pacific cod were sorted into depth intervals (0-100 m, 101-200 m, 201-300 m, 301-400 m, 401-600 m, 601-800 m, 801- 1,000 m, and 1,001-1,200 m) for measurement whereas other species were not. Pacific halibut were counted and released at the rail.

RESULTS

A total of 103 longline hauls (sets) were made (Table 1). Two hauls were made at all but station 48 (gear test site). In most cases the two hauls were set end-to-end, the first shallower than the second. Preassigned gully station No. 50 was not sampled due to time constraints.

Generally the gear performed well and few incidents of extensive damage occurred. Hauling was occasionally delayed by dense fog that obscured view of the buoys. Baiting and gear maintenance were time consuming. The hard lay gangion material wore quickly after being twisted or kinked, necessitating frequent replacement. Groundline weighting was changed somewhat from the original scheme. Originally a 3.2 kg lead ball was snapped on to the end of each 100 m skate, but launching the lead balls over the relatively high chute caused the groundline to stretch until the ball was yanked up and over the side with sudden acceleration. The jerking action stripped bait from some of the hooks near the ball. Weighting was restricted to a ball after every fourth skate, which was thrown overboard by hand, and the lighter seine weights after the remaining skates.

Sablefish was the most commonly caught species followed by Pacific cod, arrowtooth flounder, grenadiers, rockfish and Pacific halibut (Table 2). Notably large catches of sablefish were taken at stations 38, 13, 39, 8, and 34. Killer whales fed on the hooked sablefish at station 3, causing a large reduction in the day's catch. Pacific cod were most commonly captured in the western Gulf of Alaska and near Kodiak Island (station 51). Rockfish catches were highest east of Cape St. Elias.

The smallest mean sablefish lengths were found near Unalaska Island at stations 3 and 4, in the central Gulf of Alaska at stations 22 and 23, and near Cape Spencer at station 42 (Table 3). The largest mean lengths were found at stations 16 and 19 near Kodiak Island. A total of 80,363 sablefish with an estimated total round weight of 252,256 kg (555,000 lb) were recorded at the rail. The amount actually landed was slightly less due to drop-off and gaffing loses.

SCIENTIFIC PERSONNEL

Leg 1 (July 15 - August 4)
Harold Zenger, Field Party Chief, NWAFC, Resource Assessment and Conservation Division (RACE), Seattle, WA
Michael Sigler, NWAFC, Auke Bay Laboratory (ABL), Auke Bay, AK
James Long, NWAFC, RACE

Leg 2 (August 6 - August 26)
James Long, Field Party Chief, NWAFC, RACE
Craig Kastelle, NWAFC, RACE
Mark Blaisdell, NWAFC, RACE

Leg 3 (August 28 - September 21)
Michael Sigler, Field Party Chief, NWAFC, ABL
Ellen Varosi, NWAFC, ABL
Nancy Maloney, NWAFC, ABL

For further information on F/V Prowler Cruise 87-01, please contact either

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Table 1.--Haul number (set), preassigned station number, and starting and ending positions and depths for the 1987 NMFS domestic longline survey of the Gulf of Alaska, July 15 - September 21.

Haul no.	Station no.	Start lat. (ddmm.m)	Start long. (dddmm.m)	End lat. (ddmm.m)	End long. (dddmm.m)	Start depth (m)	End depth (m)
1	48	5651.7	15138.5	5647.3	15137.8	210	728
2	15	5545.3	15508.0	5541.7	15510.9	148	247
3	15	5542.0	15512.3	5538.5	15513.6	210	472
4	13	5513.4	15640.3	5509.5	15642.3	165	410
5	13	5510.1	15643.5	5506.6	15644.2	340	622
6	12	5450.5	15744.9	5446.8	15748.7	165	342
7	12	5447.6	15750.5	5443.2	15753.9	223	355
8	11	5436.6	15834.4	5434.1	15839.1	130	263
9	11	5432.9	15839.4	5429.4	15843.7	368	748
10	10	5430.3	15915.2	5426.1	15917.1	130	274
11	10	5425.5	15915.9	5422.3	15919.3	188	933
12	9	5422.0	16014.0	5417.2	16015.9	139	333
13	9	5417.0	16016.1	5411.8	16017.5	443	817
14	8	5418.8	16103.6	5415.1	16107.0	168	433
15	8	5414.5	16108.0	5411.3	16112.8	534	951
16	7	5404.7	16203.9	5402.7	16211.7	143	549
17	7	5402.9	16211.9	5404.9	16217.2	585	772
18	6	5358.1	16315.6	5355.0	16319.7	115	208
19	6	5354.4	16321.1	5351.7	16325.9	357	664
20	5	5343.8	16428.8	5339.2	16432.7	139	393
21	5	5339.6	16433.6	5336.7	16439.0	459	735
22	4	5334.7	16541.2	5330.8	16544.2	124	293
23	4	5330.0	16544.7	5326.4	16547.0	331	514
24	3	5310.9	16652.2	5306.8	16654.0	214	320
25	3	5306.1	16654.8	5301.4	16658.7	333	951
26	1	5236.4	16930.7	5232.6	16932.0	144	371
27	1	5232.5	16932.0	5229.3	16931.3	373	560
28	2	5257.9	16809.3	5254.5	16811.9	123	567
29	2	5253.7	16812.7	5250.5	16814.6	571	677
30	51	5723.0	15516.1	5720.7	15521.1	245	254
31	51	5720.0	15522.0	5716.9	15527.7	256	262
33	49	5546.2	15628.6	5541.5	15629.8	232	249
32	49	5551.4	15625.0	5546.4	15628.6	249	254
34	14	5538.2	15551.0	5533.7	15552.2	144	199
35	14	5533.6	15552.5	5529.8	15553.2	146	210
36	16	5601.8	15434.1	5558.0	15437.5	227	454
37	16	5557.5	15437.6	5554.5	15440.3	512	796
38	17	5558.7	15401.3	5554.9	15402.9	205	432
39	17	5554.3	15402.6	5550.6	15404.4	255	770
40	18	5616.9	15302.1	5613.6	15308.7	154	768
41	18	5613.1	15309.1	5610.9	15315.7	741	817
42	19	5628.0	15203.4	5624.4	15205.7	143	397
43	19	5624.0	15204.9	5622.3	15209.1	640	969
44	20	5707.0	15111.8	5702.8	15113.1	207	497
45	20	5702.4	15113.2	5659.9	15116.2	519	783
46	21	5724.1	15033.9	5720.2	15034.1	196	421

Table 1.--continued

Haul no.	Station no.	Start lat. (ddmm.m)	Start long. (dddmm.m)	End lat. (ddmm.m)	End long. (dddmm.m)	Start depth (m)	End depth (m)
47	21	5720.1	15034.6	5716.4	15037.3	461	613
48	22	5738.8	14951.1	5734.6	14955.1	331	534
49	22	5734.1	14953.3	5729.9	14957.1	552	783
50	23	5758.5	14910.0	5754.5	14914.9	157	486
51	23	5754.2	14915.2	5751.5	14919.9	503	797
52	24	5817.3	14837.3	5813.0	14839.5	196	507
53	24	5812.4	14840.2	5808.6	14843.4	532	715
54	25	5841.5	14821.1	5836.9	14820.9	282	382
55	25	5836.4	14820.9	5831.6	14821.4	428	741
56	26	5908.0	14838.9	5903.7	14839.0	144	187
57	26	5903.1	14838.7	5858.9	14839.9	187	236
58	27	5909.9	14736.5	5905.9	14737.5	208	407
59	27	5905.5	14738.0	5901.5	14738.6	417	700
60	28	5916.2	14650.7	5912.8	14657.3	187	600
61	28	5912.1	14757.3	5909.5	14703.9	664	993
63	29	5929.2	14539.4	5930.0	14548.0	732	830
62	29	5930.0	14530.4	5929.8	14538.9	154	587
64	30	5931.5	14442.6	5928.2	14447.8	190	708
65	30	5927.8	14448.8	5926.8	14455.9	625	748
66	31	5933.5	14338.2	5932.9	14345.9	157	655
67	31	5933.0	14347.1	5934.4	14354.9	823	832
68	32	5932.7	14234.0	5930.9	14240.3	128	549
69	32	5930.5	14240.8	5931.3	14247.3	585	807
70	33	5923.0	14210.2	5924.9	14217.9	232	474
71	33	5924.8	14218.3	5927.6	14222.8	545	834
72	34	5903.1	14120.1	5902.4	14128.3	276	501
73	34	5902.3	14129.4	5903.5	14136.4	576	768
74	35	5841.1	14038.5	5841.2	14046.5	225	485
75	35	5841.7	14047.6	5843.2	14054.0	494	640
77	36	5826.2	13934.9	5825.0	13940.1	878	1006
76	36	5827.9	13927.8	5826.0	13934.3	194	841
78	37	5808.2	13843.1	5809.5	13849.5	181	433
79	37	5809.2	13850.1	5810.6	13857.3	549	702
80	38	5752.5	13723.9	5753.3	13730.7	201	567
81	38	5753.3	13731.2	5752.4	13737.1	695	786
82	39	5737.5	13633.0	5737.3	13639.6	329	446
83	39	5737.1	13639.0	5739.6	13643.9	604	739
84	40	5711.7	13614.1	5714.4	13620.6	212	474
85	40	5717.6	13623.3	5714.9	13620.9	415	860
86	41	5651.5	13600.8	5654.0	13606.3	210	640
87	41	5654.2	13606.9	5657.8	13607.2	691	878
88	42	5623.0	13521.0	5621.8	13528.4	154	187
89	42	5621.7	13528.5	5620.7	13536.5	187	272
90	43	5559.0	13525.9	5558.7	13531.9	329	598
91	43	5601.3	13531.9	5603.6	13536.0	655	871
92	44	5533.5	13458.0	5535.0	13504.6	245	596
93	44	5534.9	13505.0	5537.5	13509.8	739	1061
94	45	5520.2	13443.5	5522.1	13450.2	254	655

Table 1.--continued

Haul no.	Station no.	Start lat. (ddmm.m)	Start long. (dddmm.m)	End lat. (ddmm.m)	End long. (dddmm.m)	Start depth (m)	End depth (m)
95	45	5523.1	13450.7	5522.8	13457.9	622	830
96	46	5454.6	13417.3	5457.4	13423.2	216	549
97	46	5457.6	13423.9	5501.2	13427.7	750	860
98	47	5428.0	13356.7	5430.5	13401.9	254	713
99	47	5430.6	13402.8	5433.1	13404.8	646	903
100	52	5600.3	13516.1	5603.7	13519.0	357	377
101	52	5608.0	13517.8	5604.3	13513.4	324	373
102	53	5603.3	13502.1	5559.8	13458.5	401	391
103	53	5605.4	13500.8	5601.8	13455.5	329	344

Table 2.--Catch in number by species and station for the 1987 NMFS domestic longline survey of the Gulf of Alaska, July 15 - September 21.

Station number	Sable fish	Pacific cod	Grenadier	Pacific halibut	Arrowtooth flounder	Greenland turbot	Rockfish	Shortspine thornyhead	Skate	Other spp[a]
1	1,141	273	316	121	50	6	52	145	37	11
2	1,353	196	229	248	66	1	107	71	14	11
3[b]	389	170	128	103	119	0	55	154	15	5
4	1,626	285	42	47	222	0	7	57	36	28
5	1,661	100	307	43	68	0	20	83	14	7
6	1,401	820	85	113	60	1	77	55	23	37
7	1,670	178	275	18	173	4	55	142	10	9
8	2,482	202	252	34	69	3	30	83	4	4
9	1,253	448	111	97	91	1	34	96	1	6
10	1,279	699	231	67	79	0	1	98	1	10
11	1,463	150	194	130	132	0	18	55	3	10
12	2,025	215	4	120	240	0	26	27	14	9
13	2,689	0	55	6	94	0	25	181	4	1
14	591	341	0	224	475	0	4	0	6	12
15	601	497	24	79	405	0	18	10	24	10
16	1,814	1	230	21	188	4	71	184	17	7
17	1,451	190	60	102	158	5	43	133	15	2
18	2,143	6	281	28	98	1	33	208	6	1
19	738	240	436	71	202	0	30	46	2	3
20	1,988	18	49	36	95	0	9	84	0	8
21	1,444	61	44	39	221	1	13	108	3	9
22	1,545	1	82	11	32	1	10	136	8	2
23	1,768	169	56	45	105	0	44	82	16	5
24	1,577	74	75	8	282	0	13	134	15	11
25	1,174	295	60	99	145	0	181	61	4	9
26	2,178	179	0	74	192	0	9	11	11	12
27	1,224	337	2	50	126	0	137	61	4	14
28	1,513	133	326	25	16	0	38	47	7	7
29	968	101	408	57	70	0	50	86	22	18
30	2,127	179	61	78	49	0	65	94	9	22
31	1,676	181	48	45	37	0	38	57	3	10
32	1,593	228	47	223	16	0	133	40	8	11
33	1,513	57	59	84	38	0	101	88	3	4
34	2,302	0	1	80	19	0	185	55	8	3
35	1,259	0	43	56	90	0	295	20	5	1
36	1,615	92	68	83	47	0	129	18	2	19
37	721	0	22	71	14	0	91	13	1	12
38	2,764	0	2	17	23	0	109	44	6	7
39	2,595	0	1	1	10	0	246	38	1	2
40	1,852	6	20	44	100	0	178	50	6	8
41	2,175	0	74	38	185	1	200	63	5	7
42	1,006	234	0	313	298	0	409	1	25	109
43	1,520	0	1	23	14	0	553	192	13	4
44	1,569	24	44	69	51	0	210	50	11	14
45	1,786	2	4	12	21	0	223	82	4	26

Table 2.--continued

Station number	Sablefish	Pacific cod	Grenadier	Pacific halibut	Arrowtooth flounder	Greenland turbot	Rockfish	Shortspine thornyhead	Skate	Other spp[a]
46	1,193	6	18	64	48	0	186	32	8	167
47	1,001	61	22	72	19	0	267	59	14	187
48[c]	822	14	50	8	31	0	6	18	3	1
49[d]	934	418	0	116	271	0	6	0	37	38
51[d]	1,270	1,447	0	256	65	0	13	0	11	32
52[d]	2,176	0	0	102	126	0	3	46	9	14
53[d]	1,745	1	0	117	90	0	25	53	18	66
Total	80,363	9,329	4,947	4,088	5,935	29	4,881	3,751	546	1,042

[a] Other species: spiny dogfish, Pacific sleeper shark, blue shark, spotted ratfish, flathead sole, Dover sole, rock sole, searcher, Pacific pomfret, various sculpins, Pacific flatnose, walleye pollock, lingcod, chinook salmon, coho salmon, pink salmon, giant wrymouth, twoline eelpout, tanner crab, snails, octopus, and starfish

[b] Killer whales fed on hooked sablefish

[c] Test set with 80 skates

[d] Gully stations

Table 3.--Sablefish mean length, mean round weight, mean dressed weight, number of sablefish, and estimated total round weight by station, for the 1987 NMFS domestic longline survey of the Gulf of Alaska, July 15 - September 21.

Station number	Mean length (cm)	Mean round weight (kg)[a]	Mean dressed weight (lb)[b]	Number of sable fish	Estimated total round weight (kg)[c]
1	69.0	3.5	4.6	1,141	3,994
2	67.0	3.2	4.2	1,353	4,330
3	57.0	1.9	2.5	389	739
4	62.0	2.5	3.2	1,626	4,065
5	64.0	2.7	3.6	1,661	4,485
6	67.0	3.2	4.2	1,401	4,483
7	68.0	3.3	4.4	1,670	5,511
8	67.0	3.2	4.2	2,482	7,942
9	66.0	3.0	4.0	1,253	3,759
10	66.0	3.0	4.0	1,279	3,837
11	65.0	2.9	3.8	1,463	4,243
12	66.0	3.0	4.0	2,025	6,075
13	68.0	3.3	4.4	2,689	8,874
14	58.0	2.0	2.6	591	1,182
15	67.0	3.2	4.2	601	1,923
16	71.8	4.0	5.3	1,814	7,256
17	66.5	3.1	4.1	1,451	4,498
18	70.2	3.7	4.9	2,143	7,929
19	71.8	4.0	5.3	738	2,952
20	66.4	3.1	4.1	1,988	6,163
21	66.4	3.1	4.1	1,444	4,476
22	63.4	2.7	3.5	1,545	4,172
23	63.9	2.7	3.6	1,768	4,774
24	64.1	2.8	3.6	1,577	4,416
25	64.9	2.9	3.8	1,174	3,405
26	63.0	2.6	3.4	2,178	5,663
27	63.0	2.6	3.4	1,224	3,182
28	67.0	3.2	4.2	1,513	4,842
29	64.0	2.7	3.6	968	2,614
30	65.0	2.9	3.8	2,127	6,168
31	66.0	3.0	4.0	1,676	5,028
32	68.1	3.3	4.4	1,593	5,257
33	66.2	3.1	4.0	1,513	4,690
34	66.6	3.1	4.1	2,302	7,136
35	69.8	3.6	4.8	1,259	4,532
36	68.0	3.3	4.4	1,615	5,330
37	70.2	3.7	4.9	721	2,668
38	68.9	3.5	4.6	2,764	9,674
39	69.3	3.5	4.7	2,595	9,083
40	68.0	3.3	4.4	1,852	6,112
41	70.2	3.7	4.9	2,175	8,048
42	61.4	2.4	3.1	1,006	2,414
43	65.6	3.0	3.9	1,520	4,560
44	65.3	2.9	3.8	1,569	4,550

Table 3.--continued

Station number	Mean length (cm)	Mean round weight (kg)[a]	Mean dressed weight (lb)[b]	Number of sable fish	Estimated total round weight (kg)[c]
45	66.3	3.1	4.0	1,786	5,537
46	67.6	3.3	4.3	1,193	3,937
47	66.6	3.1	4.1	1,001	3,103
48	68.0	3.3	4.4	822	2,713
49	64.9	2.9	3.8	934	2,709
51	67.5	3.2	4.3	1,270	4,064
52	65.6	3.0	3.9	2,176	6,528
53	70.8	3.8	5.0	1,745	6,631
Totals				80,363	252,256

[a] Mean round weight was calculated with mean length and a length-weight relationship.

[b] Mean dressed weight was estimated using a recovery rate of 0.6 of round weight.

[c] Estimated total round weight is the product of mean round weight and the number of sablefish that came to the rail including approximately 3% that were lost during landing.

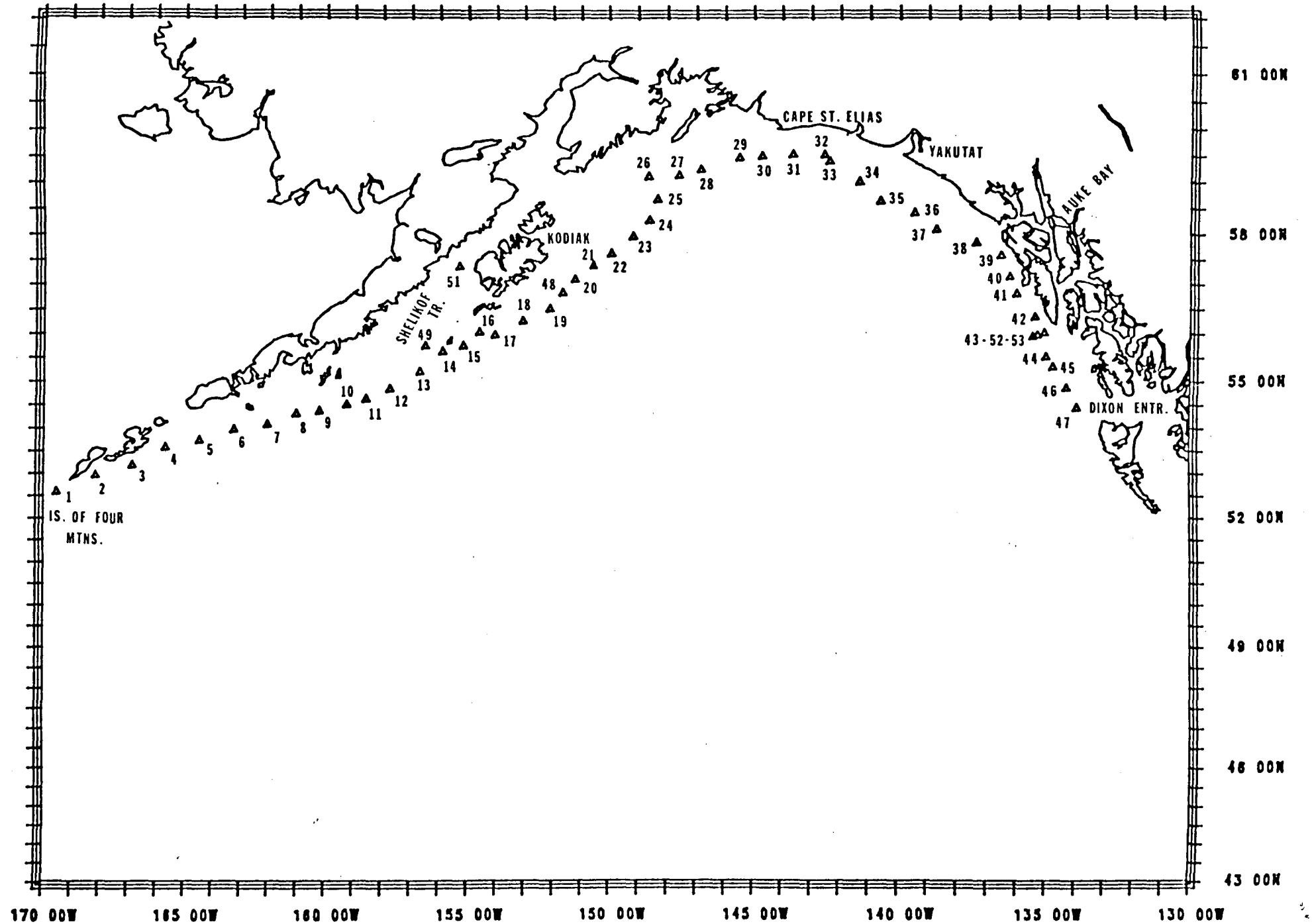

Figure 1.--Station locations for the 1987 Gulf of Alaska domestic longline survey.